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are in fact so great that it is difficult to generalize except in the broadest way. There are very few slips in the book, but it is misleading to read on page 113 that Surgeon-General Sternberg established in 1899 a commission "to study the yellow-fever mosquito theory in Cuba." As a matter of fact the commission was established "for the purpose of pursuing scientific investigations with reference to the infectious diseases prevalent on the Island of Cuba," and it was, as is shown in Agramonte's important article in the last number of *The Scientific Monthly*, the commission's idea experimentally to test Finlay's theory. In this error Professor Herms probably followed the writer's early book "Mosquitoes" (New York, 1901), but it has been several times corrected.

There is much to be said in favor of the rapidly growing substitution of half-tones from good clear photographs for photo-engravings of line and stipple drawings, but it is possible to carry this to an extreme. For example, the illustration of the two-spotted corsair (*Rasahus biguttatus*), page 78, can by no means be considered as a competent illustration of this species, unless it were stated to be a specimen crushed by a violent slap when engaged in sucking the blood of the author! This, however, is an exception, and the great majority of the figures are very good.

Very many students in the universities and colleges and in the medical colleges as well are turning their attention to medical entomology, and perhaps the most rapid advances in the whole field of economic entomology in the immediate future will be in this direction. The timeliness and usefulness of Professor Herm's book under these circumstances can not be doubted, and both he and his department at Berkeley are to be congratulated.

L. O. HOWARD

Senescence and Rejuvenescence. By C. M. CHILD. Chicago, The University of Chicago Press. Pp. xi + 481. 201 figures.

A number of biologists have attempted to solve the problem of rejuvenescence by denying its existence. Living substance, they say, grows old, but can never grow young. In each

individual some part remains young and it is this that supplies the substance for the process of senescence. Professor Child is not of this belief. To him "growing young" is as real a phase of development as "growing old." This is natural to one who has seen and described the formation of sex-cells from tissue cells and to whom structure is merely a product of function. For some time he has been making a study of rate of metabolism as a criterion of senescence and rejuvenescence and the present volume is largely an exposition of the results of these experiments with a discussion of their significance for the problem of development.

A considerable mass of evidence, according to the author, proves that susceptibility to the cyanides, ethyl alcohol, ethyl ether and similar substances is directly proportional to the rate of metabolism when the strength of the solution is sufficient to kill within a few hours. On the other hand, if the solution is so weak that there is an acclimation effect the animals with the higher rate live longer than those with the lower rate. Starving animals form an exception to the latter rule.

These methods show that increase in age is in general accompanied by decrease in rate of metabolism, but that there are one or more periods in each life cycle that are accompanied by an increase in rate. According to Child these are the periods of rejuvenescence and are found not only in the early cleavage stages following the union of the egg and spermatozoon, but also in the early period of regeneration, in starving animals and under other conditions. He concludes from these considerations that rejuvenescence is a fundamental phenomenon in development and is by no means confined to sexual reproduction. As a matter of fact the changes in metabolism due to amount and character of food and to other environmental factors are according to him in no essential respect different from the others. This attempt to prove fundamental similarity between minor metabolic changes and the major processes of the life cycle may be criticized, but Child considers it to be one of the principal virtues of his discussion. When put in physio-

logical terms senescence does not follow an unbroken course.

Non-energetic formulæ do not appeal to the author. In fact he seems to delight in showing his antagonism toward them. For instance, he says that "attempts to connect particular facts with particular chromosomes or parts of chromosomes are not at the present, properly speaking, scientific hypotheses." This and similar statements leave no doubt as to the direction of Professor Child's interest. They may, unfortunately, keep some readers from a fair consideration of the very valuable results of his work.

The extent of the ground covered in the book is well indicated by the titles of the five parts. I. The Problem of Organic Constitution. II. An Experimental Study of Physiological Senescence and Rejuvenescence in the Lower Animals. III. Individualism and Reproduction in Relation to the Age Cycle. IV. Gametic Reproduction in Relation to the Age Cycle. V. Theoretical and Critical. About half of the space is devoted to the experiments of the author and the greater part of the observations appear here for the first time.

The importance of the facts and their general interest make it a matter for congratulation that they have appeared in this connected form rather than in separate papers. The book will be welcomed by all those interested in the problem of development.

CHARLES ZELENY

Land Magnetic Observations, 1911-1913 and Reports on Special Researches. By L. A. BAUER AND J. A. FLEMING. Washington, D. C., 1915. Publication No. 175, Vol. 2, of the Carnegie Institution of Washington. 4to. Pp. v+278. 13 plates, 9 text-figures.

This is the second volume of the "Researches of the Department of Terrestrial Magnetism," the first volume having dealt with the magnetic observations on land from 1905 to 1910. Some idea of the magnitude of the work carried out under Dr. Bauer's energetic leadership can be gained from the statement that during the eight years following the founding of the department the various expe-

ditions by land and sea covered in all nearly a million miles. Observations were made in 103 different countries and island groups. The results of these expeditions and of special investigations have been embodied in about 125 articles and publications. It is now expected that one of the chief objects for which the Department of Terrestrial Magnetism was founded, the general magnetic survey of the globe between latitudes 70° N. and 65° S., will be completed in 1916. Up to the present time this remarkable achievement has been accomplished without loss of life.

In view of the ever-changing values of the magnetic elements and of our imperfect knowledge of the secular variation in many parts of the earth, it is of immense importance in the analysis of the earth's magnetic field, and thereby ultimately to the navigator and surveyor, that magnetic data be secured for the whole globe at as nearly the same epoch as possible. As has often been remarked, we can never hope to know much about the magnetic field in a vertical direction above or below the earth's surface. Hence a minute and accurate knowledge of the magnetic field over the surface to which we are confined is of all the more importance. It will be greatly to the credit of the Carnegie Institution to have accomplished the task in less than a decade. No cooperation of civilized governments could be expected to do this. It is precisely in work of this sort that a richly endowed private institution can render its greatest service.

The first part of the volume is devoted to a description of instruments, with their corrections, and the magnetic standards finally adopted. Two new universal types of magnetometer have been developed by the department, and seven complete instruments have been constructed in the department's shop. Many persons not directly interested in magnetism would find it to their advantage to examine the ingenuity and elegance of some of the instrumental details.

The old-fashioned dip circle, with its eccentricities both literal and figurative, has largely given place to the earth inductor. Nothing is said about trouble from thermo-electric cur-